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USE OF AN AGENT TO TREAT HUMAN HAIR  
[Verwendung eines Mittels zum Behandeln von menschlichen Haaren]

Dr. Mustafa Grit

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INVENTOR	(72):	Dr. Mustafa Grit
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## Description

The invention under consideration concerns the use of a composition as a hair treatment agent, in particular, as a hair conditioning agent, which imparts an improved volume, increased luster, and easy combability to human hair.

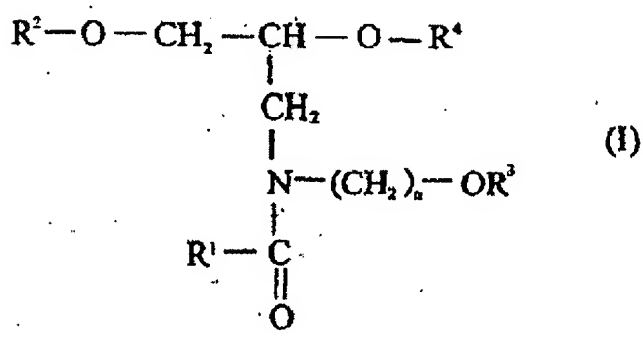
Agents for the conditioning of human hair have been known for a long time. As a rule, they contain quaternary ammonium compounds, which have at least one long-chain alkyl or alkenyl group and, perhaps, polymers also. Such agents are usually made as aqueous dispersions or emulsions, microemulsions, gels, or also in aerosol form, and used as hair rinses, cure treatment agents, etc.

An overview of the known hair post-treatment agents and their composition can be found in the monograph by K. Schrader, Fundamentals and recipes of cosmetics, 2nd Edition (1989), pages 722-781, in particular, pages 728-737.

These known compositions can still be improved however.

It was then discovered that a hair treatment agent, which imparts improved characteristics to the hair with topical application, particularly clearly increased volume, easier wet and dry combability, and a decent luster, is obtained if such an agent contains, on an aqueous basis, a combination of

a) 0.05-15 wt%, at least a compound of the following general formula I:



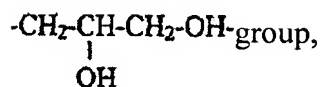
\* [Numbers in right margin indicate pagination of the original text.]

wherein  $R^1$  and  $R^2$  denote the same or different alkyl or alkenyl radicals with 10-22 carbon atoms;  $R^3$  stands for hydrogen or a methyl, ethyl, n-propyl, or isopropyl group;  $R^4$  signifies hydrogen, a hydroxymethyl, hydroxyethyl, dihydroxyethyl, or dihydroxypropyl group; and n, a whole number of 1-6; and

b) 0.5 to 15 wt% urea, relative to the total composition of the agent.

Component a) of the mixture used in accordance with the invention is a ceramide of the structure defined in formula I. The preferred groups  $R^1$  and  $R^2$  are  $C_{12}$ - $C_{18}$ -alkyl radicals; n, a number of 1-3;  $R^3$  preferably denotes hydrogen or a methyl radical; and  $R^4$ , hydrogen or a dihydroxypropyl radical.

Particularly preferred are compounds in which  $R^1$  represents a  $C_{12}$ - $C_{24}$ -alkyl radical, in particular, a  $C_{13}$ - $H_{27}$ -alkyl group;  $R^2$ , a  $C_{14}$ - $C_{18}$  alkyl radical, in particular, a  $C_{16}$ - $H_{33}$ -alkyl group;  $R^3$ , a methyl radical;  $R^4$ , a



and n, 3;

or a compound where  $R^1$  stands for a  $C_{15}$ - $C_{31}$ -alkyl radical;  $R^2$ , a  $C_{16}$ - $H_{33}$ -alkyl radical;  $R^3$  and  $R^4$ , each for a hydrogen atom; and n, for 2.

These compounds are known, in particular from EP 227 994 A1 of WO 96/37462 A1.

They are preferably contained in the hair treatment agents used, in accordance with the invention, in a quantity of approximately 0.1-10, in particular, 0.25-7.5, above all, approximately, 0.5-5 wt%, relative to the total composition of the agent.

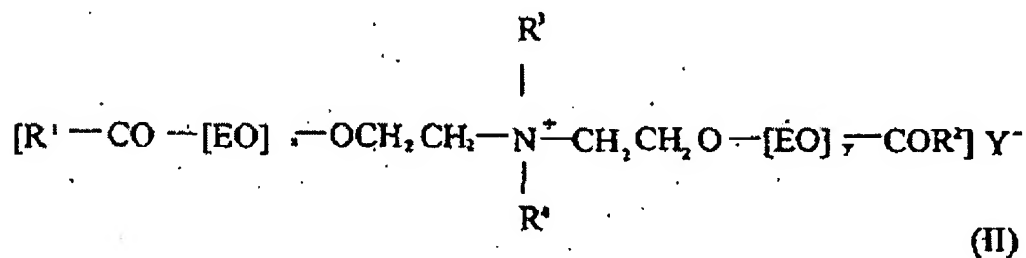
The urea is preferably contained in the agents used, in accordance with the invention, in a quantity of approximately 1-10 wt%, in particular, approximately 2.5-7.5 wt% of the agent.

The hair treatment agent used, in accordance with the invention, contains, in a preferred embodiment, approximately 0.25-15, in particular, approximately 0.5-10 wt% of the long-known quaternary ammonium compounds, containing one or two long-chain, in particular, C<sub>10</sub>-C<sub>22</sub>-alkyl radicals.

Suitable long-chain, quaternary ammonium compounds, which can be used alone or together in the mixture, are, for example, cetyl trimethyl ammonium chloride, dimethyl dicetyl ammonium chloride, trimethyl cetyl ammonium bromide, stearyl trimethyl ammonium chloride, dimethyl stearyl benzyl ammonium chloride, benzyl tetradecyclodimethyl ammonium chloride, dimethyl dihydrogenated tallow ammonium chloride, lauryl pyridinium chloride, lauryl dimethylbenzyl ammonium chloride, behenyl trimethyl ammonium chloride, lauryl trimethyl ammonium chloride, tris(oligooxyethyl) alkyl ammonium phosphate, cetyl pyridinium chloride, etc. The quaternary ammonium salts disclosed in EP 472 107 A2 are also very suitable.

In principle, all quaternary ammonium compounds, as they are listed in the valid "CTFA International Cosmetic Ingredient Dictionary," under the trivial name "quaternium," can be used.

Particularly suitable are the so-called ester quats, in particular, those with the following general formula II:



in which R<sup>1</sup> and R<sup>2</sup> stand for a perhaps hydroxy-substituted C<sub>8</sub>-C<sub>22</sub>-alkyl or alkenyl group; R<sup>3</sup> and R<sup>4</sup>, for a C<sub>1</sub>-C<sub>3</sub>-alkyl group, or a -CH<sub>2</sub>-CH<sub>2</sub>-O-[EO]<sub>z</sub>H group, and x, y, and z for 0 to 5; and Y<sup>-</sup>, for an anion.

A particularly preferred compound of formula II within the framework of the invention is one in which the radicals  $R^1$  and  $R^2$  denote an oleyl group or a  $C_{12}$ - $C_{18}$ -alkyl group; the radical  $R^3$ , a methyl group; and the radical  $R^4$ , a  $-\text{CH}_2-\text{CH}_2-\text{O}-(\text{EO})_x-\text{H}$  group.

The anion  $Y^-$  is preferably a halide, such as  $\text{Cl}^-$  or  $\text{Br}^-$ , a lower alkyl sulfate, for example, methosulfate, and ethosulfate, or an alkyl phosphate, but of course, other radicals can also be used.

These compounds are, in fact, known and, for example, are under the tradenames "Schercoquat<sup>A</sup>," "Dehyquart<sup>R</sup>F30," and "Tetranyl<sup>R</sup>" on the market.

The use of these compounds, so-called "ester quats," in hair care agents is, in fact, known and, for example, described in WO 93/10748 A1, WO 92/06899 A1, and WO 94/16677 A1, where no indication is given, however, as to the inventive combination and its advantageous characteristics.

The hair treatment agents used in accordance with the invention can also contain, as another component, at least one compound selected from the group 1-methoxypropanol(-2), 1-ethoxypropanol(-2), diethylene glycol monomethyl or ethyl ether, dipropylene glycol monomethyl or ethyl ether, benzyl alcohol, benzyl oxyethanol, phenyl ethyl alcohol, phenoxy ethanol, and/or cinnamic alcohol, preferably, in a quantity of 0.5-25, in particular, 1-20, above all, 2.5-15 wt%, relative to the total composition of the agent. Preferred compounds of this group are ethoxy diglycol and benzyl oxyethanol.

Another preferred optional component in the hair care agents used in accordance with the invention is a  $C_{10}$ - $C_{24}$  fatty acid.

As fatty acid, those with 14-22 carbon atoms are preferably used in a quantity of approximately 0.1-15 wt%, in particular, 0.5-10 wt%, relative to the total composition. Particularly suitable are behenic acid and stearic acid; other fatty acids, such as myristic acid, palmitic acid, or oleic acid, or natural and synthetic fatty acid mixtures, such as coconut oil fatty acid also are used.

The hair treatment agents used in accordance with the invention can, of course, also contain the components usual in such agents; to avoid repetition, reference is made, once again, to K. Schrader, "Fundamental and recipes of cosmetics," 2nd Edition (1989), pages 722-771.

Suitable additives are, for example, synthetic or natural hair-conditioning polymers, preferably, in a quantity of 0.1-2.5, in particular, 0.25-1.5 wt% of the total composition.

Particularly preferred are hereby the cationic (co)polymers, known under the CTFA designation "polyquaternium," alone or also in a mixture with nonionic, anionic, and/or amphoteric polymers, for example, those of the "Amphomer<sup>R</sup>" type.

Other additives, whose type and quantity are dependent, of course, on the application form of the agent, include fats, fatty alcohols, emulsifiers, pH regulators, dissolution agents and diluents, dissolving intermediaries, preservatives, perfumes, etc.

Suitable fats and oils, among which are waxes also, are, in particular, natural oils, such as avocado oil, coconut oil, palm oil, sesame oil, peanut oil, sunflower oil, almond oil, peach kernel oil, wheat germ oil, macadamia nut oil, evening primrose oil, jojoba oil, castor oil, or also olive or soybean oil, lanolin and its derivatives, as well as mineral oils, such as paraffin oil and Vaseline.

Synthetic oils and waxes are, for example, silicone oils, polyethylene glycols, etc. Other suitable hydrophobic components are, in particular, fatty alcohols, preferably those with approximately 8-22 carbon atoms in the molecule, such as myristyl, cetyl, stearyl alcohol, wax alcohols, and fatty acid esters, such as isopropyl myristate, palmitate, stearate, and isostearate, oleyl oleate, isocetyl stearate, hexyl laurate, dibutyl adipate, dioctyl adipate, myristyl myristate, oleyl erucate, polyethylene glycol and polyglyceryl fatty acid ester, such as PEG-7-glyceryl cocoate, cetyl palmitate, etc.

These hydrophobic components are contained in the composition used in accordance with the invention, preferably in a total quantity of approximately 0.5 to approximately 10, in particular, approximately 1-7.5, above all approximately 1.5-5 wt%, relative to the total composition.

Likewise, it is possible to use, in addition to the above-mentioned, quaternary, long-chain ammonium compounds, other surface-active substances also, in particular, amphoteric or zwitterionic and/or nonionic surfactants, whose relevant use, of course, is, in fact, known.

A summary of the preparation of such agents can be found also, by way of example, in the already mentioned monograph by K. Schrader, pages 798-818, in particular, pages 804 ff.

A preferred tenside group comprises the known C<sub>8</sub>-C<sub>20</sub>-alkylpolyglucosides, preferably those with a degree of polymerization of approximately 1.1 to approximately 5, in a preferred quantity of approximately 0.5 to approximately 20, in particular, 1 to approximately 10 wt%, relative to the total composition.

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The hair-conditioning agents used in accordance with the invention are preferably present as aqueous or aqueous/alcoholic solution, aqueous emulsion, microemulsion, dispersion, or opaque or transparent gel, and can also be made as aerosols. Such compositions and their preparation are basically known to the specialist and therefore do not require a more detailed explanation.

The pH value of the hair treatment agents in accordance with the invention is not critical; it can preferably be at 3 to approximately 8, in particular, between 4 and 6.5.

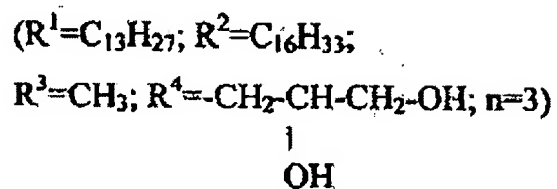
The following examples illustrate the invention:

### Example 1

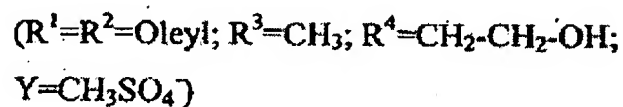
Behenic acid 1.0 (wt%)

Avocadin<sup>R</sup> 0.5

Compound of formula I 0.5



Compound of formula II 1.0



Stearic trimonium chloride 1.0

1,2-Propanediol 5.0

Coconut amidopropyl betaine 1.5

C<sub>12</sub>-C<sub>24</sub>-Alkylpolyglycoside (P.D.~1,5) 2.5

Urea 5.0

Preservative 0.3

Perfume 0.3

Water to 100.0

### Example 2

Behenic acid	2.0 (wt%)
Stearic acid	1.0
N-(3-Hexadecyloxy-2-hydroxypropyl)-N- 2-hydroxyethyldecanamide (Ceramide)	0.5
Compound of formula II ( $R^1 = C_{18}H_{37}$ ; $R^2 = C_{11}H_{23}$ ; $R^3 = R^4 = CH_3$ ; $Y = Cl^-$ )	3.0
Stearic trimonium chloride	1.0
1,2-Propanediol	2.5
Urea	5.0
$C_8$ - $C_{20}$ -Alkylpolyglycoside (P. D. ~ 1.4)	4.5
Perfume	0.3
Preservative	0.3
Water	to 100.0

### Example 3

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Behenic acid	2.5 (wt%)
Avocadin <sup>R</sup>	0.5
Compound of formula I ( $R^1 = C_{13}H_{27}$ ; $R^2 = C_{16}H_{33}$ ; $R^3 = CH_3$ ; $R^4 = CH_2 - \overset{\text{OH}}{\underset{ }{CH}} - CH_2 - OH$ ; $n=3$ )	0.5
Compound of formula II ( $R^1 = R^2 = C_{12}H_{25}$ ; $R^3 = CH_3$ ; $R^4 = CH_2 - OH$ ; $Y = Cl^-$ )	3.5

1,2-Propanediol	5.0
Urea	5.0
C <sub>12</sub> -C <sub>14</sub> -Alkylpolyglycoside (P.D.~1,5)	3.5
Perfume	0.3
Preservative	0.4
Water	to 100.0

With the compositions used in accordance with the invention, an excellent hair conditioning effect and a luster attained both with and also without rinsing out after an effect of 10 min, which were clearly better than when the component according to formula I or the urea was omitted.

Also the wet and dry combability of the treated hair was clearly improved. These effects can also be confirmed by in vitro investigations.

The following

#### Example 4

describes another hair rinse used in accordance with the invention: wt%

Compound of formula I ( $R^1 = C_{15}H_{31}$ ; $R^2 = C_{16}H_{33}$ ; $R^3 = R^4 = H$ ; $n = 2$ )	0.2
Cetrimonium chloride	2.5
Dimethicone copolyol beeswax	1.0
Cetyl stearyl alcohol	1.0
C <sub>8</sub> -C <sub>10</sub> -Alkylpolyglucoside (P. D. ~ 1,4)	1.5
1,2-Propanediol	2.0
Hydroxyethylcellulose	0.8

Urea	4.5
Stearic acid	3.0
Behenic acid	3.0
Behenic trimonium chloride	0.4
Avocadin	1.5
Isostearyl glyceryl ether	0.2
Perfume	0.3
Preservative	0.3
Dyes, UV absorber	q.s.
NaOH	q.s.
Water	to 100.0

Also with this hair rinse, both an improved wet combability and, after rinsing and drying, an excellent dry combability and hair with a decent luster, fullness, and elasticity (resilience) were obtained.

#### Example 5

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#### Buildup cure

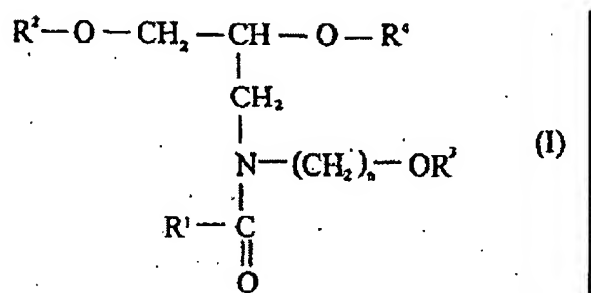
	wt%
Compound of formula I ( $R^1 = C_{15}H_{31}$ ; $R^2 = C_{16}H_{33}$ ; $R^3 = R^4 = H$ ; $n = 2$ )	0.5
Stearic trimonium chloride	0.7
Compound of formula II ( $R^1 = R^2 = \text{Oley}$ ; $R^3 = CH_3$ ; $R^4 = CH_2-CH_2-OH$ ; $Y = CH_3SO_4^-$ )	1.0
Urea	4.0
Quaternium-80	0.2

Avocado oil	0.5
Wheat protein hydrolyzate	0.4
PBG-60-hydrogenated castor oil	0.5
Paraffin oil	1.5
1,2-Propanediol	8.0
Triglycerol	0.8
Ceteareth-20	1.0
Cetearyl alcohol	5.0
Perfume, preservative	q.s.
Water	to 100.0

### Claims

1. Use of an aqueous composition, containing a combination of

a) 0.05-15 wt% of at least one ceramide of general formula I:

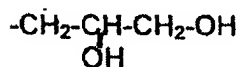


wherein  $\text{R}^1$  and  $\text{R}^2$  denote the same or different alkyl or alkenyl radicals with 10 to 22 carbon atoms;

$\text{R}^3$  stands for hydrogen or a methyl, ethyl, n-propyl, or isopropyl group;  $\text{R}^4$  signifies hydrogen, a hydroxymethyl, hydroxyethyl, dihydroxyethyl, or dihydroxypropyl group; and n, a whole number of 1-6; and

b) 0.5-15 wt% urea, relative to the total composition of the agent, for the treatment of human hair.

2. Use according to Claim 1, containing a ceramide of formula I, wherein  $R^1$  denotes a  $C_{12}$ - $C_{14}$ -alkyl radical;  $R^2$ , a  $C_{14}$ - $C_{18}$ -alkyl radical;  $R^3$ , a methyl group; and  $R^4$ , the group:



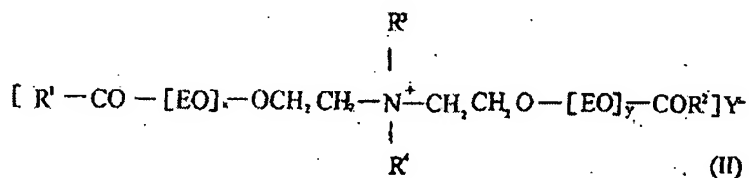
3. Use according to Claim 1, containing a ceramide of formula I, wherein  $R^1$  denotes a  $C_{15}H_{31}$ -alkyl radical;  $R^2$ , a  $C_{16}H_{33}$ -alkyl radical;  $R^3$  and  $R^4$ , each a hydrogen atom; and n, 2.

4. Use according to one or more of Claims 1-3, also containing 0.5-15 wt% of at least one  $C_{10}$ - $C_{24}$ -fatty acid, relative to the total composition.

5. Use according to one or more of Claims 1-4, also containing 0.25-10 wt% of at least one quaternary ammonium salt with one or two  $C_{10}$ - $C_{22}$ -alkyl groups, relative to the total composition.

6. Use according to Claim 5, containing as a long-chain, quaternary ammonium compound, one of general formula II:

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in which each  $R^1$  and  $R^2$  stands for a perhaps hydroxy-substituted  $C_1$ - $C_{22}$ -alkyl or alkenyl group;  $R^3$  and  $R^4$ , for a  $C_1$ - $C_3$ -alkyl group or a  $-\text{CH}_2\text{-CH}_2\text{O-[EO]}_z\text{-H}$  group; and x, y, and z, for 0-5; and  $Y^-$ , for an anion.

7. Use according to Claim 6, characterized in that each radical  $R^1$  and  $R^2$  denotes an oleyl radical; the radical  $R^3$ , a methyl group; the radical  $R^4$ , a  $-\text{CH}_2\text{-CH}_2\text{OH}$  group; and x and y, 0.

8. Use according to Claim 6, characterized in that the radicals  $R^1$  and  $R^2$ , denote a  $C_{12}$ - $C_{18}$ -alkyl group; the radical  $R^3$ , a methyl group; and the radical  $R^4$ , a  $-\text{CH}_2\text{-CH}_2\text{O-[EO]}_z\text{H}$  group; and x, y, and z, 0.

9. Use according to one or more of Claims 1-8, also containing at least one amphoteric or zwitterionic, and/or nonionic surfactant.

10. Use according to Claim 9, containing as a nonionic surfactant, a  $C_{8-20}$ -alkyl polyglucoside.